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Soft Matter for the conservation of Cultural Heritage

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European Cultural Heritage (CH) is a crucial resource favoring social inclusion, job creation, and promoting resilience of our society against the emerging issues of the 21th century. Works of art interacting with the environment are prone to aging and decay. Soiling is a prime factor in the degradation of surfaces, chemical and mechanical degradation are often associated to soiling and lead to the disfigurement of a piece of art. We pioneered the synthesis and the application of several advanced systems for the consolidation and the cleaning of works of art, as microemulsions and chemical/physical gels. These systems constitute a new platform for Conservation of Cultural Heritage and are characterized by scale lengths below 100 nm, making neutrons and x-rays the primary tool for their investigation and the tailoring new cleaning tools. The new palette of materials for the conservation will be reviewed, focusing on the application of systems of increasing complexity, from o/w microemulsions to twin-PVA hydrogels. I will report on the application on artifacts of diverse origins, from Renaissance frescoes to Picasso and Pollock.Small-angle Neutron Scattering (SANS), recently used to detail the fractality and structure of a new class of green organogels, before and after swelling in two organic solvents commonly adopted in the cleaning of paintings, will be discussed. The swollen gels were then used for the conservation of Giorgio de Chirico and many other works of art.

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